Sample DCR Specifications for Accessible Pathway Surfaces
(From DCR 2015 trail repair contract)

460.1 Hot Mix Asphalt for Trails and Walkways
704 Crushed Aggregate Pathway
704.01 Granular Stabilized Pavement

ITEM 460.1 HOT MIX ASPHALT (HMA) FOR TRAILS AND WALKWAYS TON

General

All hot-mix asphalt mixes shall conform to MassDOT "Type I" mixes
Base or SBC-37.5 and SBC-25.0,
Binder or SIC-19.0 and SIC-12.5,
State Top "3/8-inch" or SSC-9.5 for Sidewalk / Trail use

Hot-Mix Asphalt for Trails and Walkways:
(The thicknesses listed below are **Minimums**).

1-1/2" MassDOT-Type "I"-"3/8 State Top" surface course or SSC-9.5, minimum
2" MassDOT- Type "I" binder course or SIC-19.0 and SIC-12.5, minimum
4" MassDOT- Type "I" base course or SBC-37.5 and SBC-25.0, minimum

The work to be done under this item shall consist of furnishing and placing plant-mixed hot-mix asphalt for construction of Trails and Walkways, and other various locations indicated on the contract Plans or as directed by the Engineer.

Materials

All bituminous concrete shall be in accordance with either the 1988 Massachusetts Highway Department Specifications for Highways and Bridges for Class I-1, Bituminous Concrete Pavements and Foundation Bases Sections 420, 460, 700 and M-3 where applicable, including the Supplemental Specifications dated June 6, 2006, and the Standard Special Provisions dated September 18, 2007. Submitted on a current Mass DOT approved Hot Mix Asphalt Job Mix Formulas sheet.
Or
SSC, SIC, SBC mixes shall be approved Mass DOT Mix Designs, submitted to the Department prior to paving for the following design levels:
Level 1- Sidewalks, trails, driveways and playing courts (50 gyrations).

The Department shall be responsible for testing the temperature, asphalt content and gradation with the Contractor or Supplier responsible for testing the volumetric properties. The Contractor or Supplier shall adjust the mix to correct any out of specified range results as quickly as possible.

The lot of mix tested shall be a split sample, taken at random for each day's production or for each 750 tons. HMA lots will be considered Category C (Minor lot) from Table 450.3 of the 2010 Quality Assurance Specification for Hot Mix Asphalt Pavement.

Method of Construction

Bituminous concrete shall be placed in one course to the grade and contour approved by the Engineer and having a thickness of 3.5 to 4 times the nominal maximum size stone in the mix being placed.

Basis of Payment

"Hot-Mix Asphalt (HMA) for Trails and Walkways", shall be paid for at the contract unit price per TON, complete in place, which price shall include all necessary tools, equipment, materials

and labor (including tree-root-cutting and removal) to complete the installation of hot-mix asphalt per this specification, and to the satisfaction of the Engineer.

Fine-grading and compacting of sub-base for areas shall be paid for under Item 170 Fine Grading and Compacting.

ITEM 704 CRUSHED AGGREGATE PATHWAY SY

Description
The work of this section consists of constructing accessible Crushed Aggregate Pathway on a prepared sub-base.

Submittals
The contractor shall submit the following submittals:

a) Sieve analysis of proposed material to ensure it meets grading requirements.

b) Sample of crushed aggregate screenings for approval to ensure color will be compatible with project site. Sample shall be sufficiently large to illustrate clearly the functional characteristics, and full range of color and texture of the material. Sieve analysis and color of crushed aggregate screenings shall be approved in writing by the Engineer before any material is delivered to the project site.

c) Prepare a sample finished trail section using all specified materials and edging. Sample section shall be full width of trail, and length equal to 2 times width. Sample trail section shall be approved in writing by the Engineer before the project stabilized crushed aggregate trail is constructed.

Materials
a) Clean, hard durable particles or fragments of 3/8" minus select brown/gray crushed granite, river rock or basalt. Fines shall be evenly mixed throughout the aggregate. When produced from gravel, 50 percent, by weight, of the material retained on a no. 4 sieve shall have one fractured face.
b) Color shall be approved by Engineer.
c) The portion retained on the No. 4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96-77.
d) The portion passing a No. 50 sieve shall have a maximum liquid limit of 25 and maximum plasticity index of 7, as determined by AASHTO T89-81 and AASHTO T90-81, respectively.
e) The crushed aggregate screenings shall be free from clay lumps, vegetable matter, and deleterious material.

Materials
Top Finish Course:
Percentage of Weight Passing a Square Mesh Sieve
AASHTO T11-82 and T27-82

Sieve Designation	Percent Passing
3/8 inch	100

No. 4	95 - 100
No. 8	75 - 80
No. 16	55 - 65
No. 30	40 - 50
No. 50	25 - 35
No. 100	20 - 25
No. 200	5 – 15

Wearing Course:
Percentage of Weight Passing a Square Mesh Sieve
AASHTO T11-82 and T27-82

Sieve Designation	Percent Passing
3/4 inch	100
3/8 inch	90 – 95
No. 4	80 – 90
No. 8	75 - 80
No. 16	55 - 65
No. 15	40 - 50
No. 30	30 - 40
No. 50	25 – 35
No. 100	20 - 25
No. 200	5 – 15

Surface Preparation:
Scarify top 2 inches of existing or new trail surface along the designated trail corridor and rest areas.

Surface Width
If the trail or pathway design width is less 5 feet wide, a resting/passing area shall be created no less every 200 feet of trail or pathway. In no instance shall the trail or pathway width be less than 3 feet.

Weed Control Fabric
Fabric shall be installed between the compacted subgrade and crushed aggregate screenings to prevent weeds from growing up through the crushed aggregate trail; pre-emergent chemicals may not be used. Place fabric across the entire width of trail surface to receive aggregate; overlap ends of rolls a minimum of 6 inches.

Eliminate Weed Control Fabric on grades exceeding 8% for runs greater than 25 feet in length.

Installation
After pre-blending, place the wearing course of crushed aggregate screenings (CAS) to a depth of 2 inches on prepared subgrade, and rake smooth using a steel rake tine to desired grade and cross section. Place to avoid segregation, in one layer of 2 inches minimum thickness.

Water heavily to achieve full depth moisture penetration of the CAS. Watering is best accomplished using a garden hose with a spray nozzle set to a coarse spray; pressure should not disturb leveled trail surface.

A one-hour application at a rate of 20 gpm per 1,000 sq.ft. of trail mix to achieve the desired full depth moisture penetration. Test for depth of water penetration by random inspection of trail cores. After inspection, fill cores with material removed, smooth and hand tamp to match adjoining trail surface grade.

Compact the CAS while still thoroughly moist. Compact to 95% density.

Inspection

a) Finished surface of trail shall be smooth, uniform and solid. Dried, compacted trail material shall be firm all the way through with no spongy areas. Loose material shall not be present on the surface initially. After the first year of use, a minor amount of loose material is expected on the surface.

b) Unconsolidated areas shall be dug out, and be replaced with new crushed aggregate screenings with a high proportion of fines meeting the grading requirements of Section 2.02 above. Patched areas then shall be wetted thoroughly and rolled smooth. Patching shall be completed prior to any trail smoothing required.

c) Any significant irregularities shall be smoothed out prior to final acceptance of work.

d) Smoothing shall be accomplished by rewetting/saturating rough areas thoroughly, then rolling the trail again with a heavy roller (1000 - 1500 lbs. powered walk-behind or small rider.)

e) Final thickness of completed trail shall not vary more than 1/2 inch from dimension indicated. Measurements may be taken by means of test holes taken at random in finished trail surface. Correct any variations in the thickness beyond the allowable 1/2 inch by repeating procedures listed above.

f) Final width of completed trail shall not vary more than 1/2 inch from typical dimension indicated. Measurements may be taken at random cross sections in the finished trail surface.

g) If used, no edges of weed control fabric shall be exposed.

Method of Measurement:

The method of measurement shall be by the square yard of installed crushed aggregate pathway.

Basis for Payment

Item 704 Crushed Aggregate Pathway will be paid by the square yard, installed complete-in-place which will include all aggregate, fabric, testing, amending, placing, spreading, and

compacting of crushed aggregate material. Gravel borrow and fine grading and compacting will be paid for separately under items 151 and 170 respectively.

ITEM 704.01 GRANULAR STABILIZED PAVEMENT SY

Description
The work under these items consists of constructing and repairing accessible Granular Stabilized Pavement on a prepared sub-base.

Pre-installation conference: A pre-installation conference is required for the work of this Section.

Submittals
The contractor shall submit the following submittals:

a) Sieve analysis of proposed decomposed granite material to ensure it meets grading requirements.
b) Specifications of the stabilizer products proposed to be used.
c) Sample of the decomposed granite, one 5-lb bag of specified mix with stabilizer product for approval to ensure color will be compatible with project site.
d) Provide certification that the ratio of stabilizer to decomposed granite is acceptable to both the stabilizer manufacturer and the decomposed granite manufacturer.
e) Provide certification that the stabilizer manufacturer approves the decomposed granite particle size as compatible with the stabilizer product.
f) Mock-up: Prepare a sample finished trail section using all specified materials and edging. Sample section shall be full width of trail, and length equal to 2 times width.
    - Sample will demonstrate all construction and hydration methods.
    - A representative from the manufacturer shall be on-site during mockup and installation activities.
    - Sample trail section shall be approved in writing by the Engineer before the project trail is constructed.

Weather Restrictions
Do not install or work with material during inclement conditions or if material is wet or frozen. Do not install decomposed granite during rainy conditions or below 40 degrees Fahrenheit and falling.

Acceptance
Finished surface of pathway shall be smooth, uniform and solid. There shall be no evidence of chipping or cracking. Dried, cured, compacted pathway shall be firm throughout profile with no spongy areas. Loose material shall not be present on the surface initially. Any significant irregularities in path surface shall be repaired to the uniformity of entire installation.

Demonstration and Training
Provide demonstration and training to the Owner in the method for repairing Decomposed Granite Surface.

Warranty and Maintenance
Contractor shall provide, for a period of sixty days following substantial completion, unconditional maintenance and repairs of the stabilized surfacing as required.

Submit a written warranty executed by the installer agreeing to repair or replace components of stabilized surfacing that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Premature wear and tear, provided the material is maintained in accordance with manufacturer's written maintenance instructions.
2. Improper drainage.
3. Failure of system to meet performance requirements.

Materials

Compacted Sub-base:

Dense graded crushed stone for sub-base shall conform to the requirements on M2.01.07 and as follows:

SIEVE DESIGNATION	% BY WEIGHT PASSING SQUARE MESH SIEVES
2"	100
1 1/2"	70 – 100
3/4"	50 – 85
#4	30 – 55
#50	8 – 24
#200	3 – 10

Decomposed Granite Pavement: Aggregate stone for decomposed granite paving shall conform to the following:

a) Clean, hard, durable particles or fragments of select crushed granite stone. Fines shall be evenly mixed throughout the aggregate. When produced from gravel, 50 percent, by weight, of the material retained on a No.4 sieve shall have one fractured face.

b) Color shall be approved by the Engineer.

c) The portion retained on the No.4 sieve shall have a maximum percentage of wear of 50 at 500 revolutions as determined by AASHTO T96-77.

d) The portion passing a No.50 sieve shall have a maximum liquid limit of 25 and a maximum plasticity index of 7, as determined by AASHTO T89-81 and AASHTO T90-81, respectively.

e) The crushed aggregate screenings shall be free from clay lumps, vegetable matter and deleterious material.

f) Size shall be 3/8" to No.200 crushed granite screenings conforming to the following crushed stone sieve analysis for percentage of weight passing a square mesh sieve, ASTM C 136 – Method for Sieve Analysis for Fine and Course:

Sieve Designation	Range of % Passing
No. 3/8"	100%

No. 4	95 – 100%
No. 8	75 – 80%
No. 16	55 – 65 %
No. 30	40 – 50%
No. 50	25 – 35%
No. 100	15 – 20%
No. 200	10 – 15%

Stabilizer binder for decomposed granite paving shall be mixed at the aggregate suppliers and conform to the following:

1. Binder shall be a natural, non-toxic, non-staining, environmentally safe, organic binder that is a colorless, odorless concentrated powder specifically manufactured to bind crushed granite or crushed aggregate. The powder shall be of a size that not more than 10% is retained on a U.S. Standard #40 mesh sieve.
2. Provide Organic-Lock by Envirobond Products Corp, Tel: 866-636-8476, www.envirobond.com or approved equal. Stabilizer shall be provided factory mixed with the aggregate stone.
3. Mix Ratio: The estimated ratio for crushed granite pavement shall be approximately 35 lbs of stabilizer per ton of compacted aggregate screenings.
4. Mix ratio is approximate. The final mix ratio shall be determined by the stabilizer supplier by testing the specific granite approved for use on this project.

Installation

The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contracting Officer in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means Contractor accepts substrates, subgrades, previous work, and conditions.

Coordination: Ensure bench footings, bike rack footings, and other site furnishing footings (when present) are in place and have been accepted prior to beginning work on the decomposed granite path.

Compacted Sub-base: Compact sub-base to 95% Standard Procter density, minimum. Provide pitch to gravel base course that is parallel to finish grade pitch of decomposed granite.

Formwork: Install plywood formwork at the outer edges of the installation. Top of formwork shall conform to proposed finish grade.

Set elevation of formwork by instrumentation.

Decomposed Granite Pavement:

Stabilizer shall not be applied during, prior to, or immediately following rainfall or when the temperature is 40 degrees Fahrenheit and falling. Inclement weather and cold to freezing temperatures will cause an unsatisfactory installation.

Pre-hydration of stabilized decomposed granite: Mix stabilized decomposed granite with water in a drum vessel or equivalent in compliance with the manufacturer's instructions. Placing of dry stabilized decomposed granite and water with hoses, sprinklers or other such devices shall not be allowed.

Place the stabilized decomposed granite on prepared aggregate base and rake smooth using a steel tine rake to desired grade and cross section.

Do not install deeper than 3 inches in one lift, and install in equal lifts. Compact each lift separately. Allow each layer after compaction to dry out.

Compaction: Roll each lift with a 1 ton roller.

Do not compact until moisture content of installed material is approved by the Manufacturer's Representative.

After completion do not allow any traffic of any kind on the finished surface course until it is completely dried through. Curing period is dependent on weather conditions. The Contractor shall expect a period up to two weeks. The stabilized crushed stone paving must completely dry out one time before it can be put into service.

Repairs

Loose gravel on the surface, or unconsolidated crushed aggregate screenings below the surface, is evidence of improper bonding due to poor mixing or insufficient watering. Test the loose material for adequate stabilizer by wetting, then tamping, and allowing it to dry. If the material is still unconsolidated, stabilizer did not get mixed adequately throughout the crushed aggregate screenings. If the material is now solid, initial watering was insufficient.

Excavate damaged area to the depth of the stabilized decomposed granite and square off sidewalls. If area is dry, moisten damaged portion lightly. Pre-blend the dry required amount of stabilizer powder with the proper amount of aggregate in a concrete mixer. Compact with an 8" to 10" hand tamp or 250 to 300 pound roller. Keep traffic off areas for 12 to 48 hours after repair has been completed.

Any significant irregularities shall be smoothed out prior to final acceptance of work. Smoothing shall be accomplished by rewetting/saturating rough areas thoroughly, and then rolling the paving again with a heavy roller (2000 lbs, minimum) powered walk-behind or small rider. Wackers are not recommended.

Maintenance

Remove debris, such as paper, grass clippings, leaves or other organic material by mechanically blowing or hand raking the surface as needed. Any plowing program required during winter months shall involve the use of a rubber baffle on the plow blade or wheels on the plow that lifts the blade 1/4" off the paving surface.

1. If cracking occurs, simply sweep fines into the cracks, water thoroughly and hand tamp with an 8" – 10" hand tamp plate.
2. The Contractor shall monitor the site during the maintenance period and redistribute loose material, water thoroughly to a depth of 1" and re-compact with a power roller of no less than 1000 lbs.

Method of Measurement
The method of measurement shall be by the square yard of installed Granular Stabilized Pavement path.

Basis for Payment
Item 704.01 Granular Stabilized Pavement and 704.02 Granular Stabilized Pavement Repair will be paid by the square yard, installed complete-in-place which will include all aggregate, polymer enhanced binder, testing, amending, placing, spreading, and compacting of polymer enhanced aggregate material. Gravel borrow and fine grading and compacting will be paid for separately under items 151 and 170 respectively.